

TITLE OF THE INVENTION

INFORMATION PROCESSING SYSTEM AND METHOD OF CONTROLLING
SAME, INFORMATION PROCESSING APPARATUS AND METHOD OF
5 CONTROLLING SAME, AND COMPUTER-READABLE MEMORY

BACKGROUND OF THE INVENTION

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10 This invention relates to an information processing system having a multifunction apparatus, which includes a facsimile function, and an information processing apparatus, a method of controlling this system, an information processing apparatus and a method of controlling the same, and a computer-readable memory.

15 When facsimile transmission is performed using a multifunction apparatus having a facsimile function according to the prior art, documents having paper sizes of a plurality of types can be transmitted with their paper sizes mixed. This makes it possible to transmit
20 documents of a plurality of different paper sizes.

However, if documents of a plurality of mixed paper sizes for transmission are to be transmitted upon making the paper sizes uniform, it is necessary that the documents for transmission be created again in the case
25 of the conventional multifunction apparatus described above. Further, in order to make the size of a cover

page that is attached to a document to be transmitted the same as that of the paper of the document, it is necessary to prepare a cover page having a size the same as that of each paper size that is capable of being transmitted. Thus, though documents having a plurality of different paper sizes can be transmitted, the conventional apparatus is not easy to use and documents cannot be transmitted efficiently.

SUMMARY OF THE INVENTION

Accordingly, an object of the present invention is to provide an information processing system and a method of controlling the same, an information processing apparatus and a method of controlling the same, and a computer-readable memory that make it possible to transmit documents efficiently.

According to the present invention, the foregoing object is attained by providing an information processing system having a multifunction apparatus, which is equipped with a facsimile function, and an information processing apparatus, the system comprising: temporary storing means for temporarily storing, on a storage medium in an intermediate data format, output image data composed of a plurality of pages as well as output configuring information; acquisition means for

acquiring output size of a prescribed page from the
 output configuring information of the output image data
 in the intermediate data format stored temporarily by
 the temporary storing means; and changing means for
 5 changing the size of each page of the output image data
 based upon the output size acquired by the acquisition
 means.

According to the present invention, the foregoing
 object is attained by providing an information
 10 processing apparatus connected to a multifunction
 apparatus equipped with a facsimile function, the
 information processing apparatus comprising: temporary
 storing means for temporarily storing, on a storage
 medium in an intermediate data format, output image data
 15 composed of a plurality of pages as well as output
 configuring information; acquisition means for acquiring
 output size of a prescribed page from the output
 configuring information of the output image data in the
 intermediate data format stored temporarily by the
 20 temporary storing means; and changing means for changing
 the size of each page of the output image data based
 upon the output size acquired by the acquisition means.

According to the present invention, the foregoing
 object is attained by providing a method of controlling
 25 an information processing system having a multifunction
 apparatus, which is equipped with a facsimile function,

and an information processing apparatus, the method comprising: a temporary storing step of temporarily storing, in the information processing apparatus in an intermediate data format, output image data composed of a plurality of pages as well as output configuring information; an acquisition step of acquiring output size of a prescribed page from the output configuring information of the output image data in the intermediate data format stored temporarily in the information processing apparatus; and a changing step of changing the size of each page of the output image data based upon the output size acquired at the acquisition step.

According to the present invention, the foregoing object is attained by providing a method of controlling an information processing apparatus connected to a multifunction apparatus equipped with a facsimile function, the method comprising: a temporary storing step of temporarily storing, on a storage medium in an intermediate data format, output image data composed of a plurality of pages as well as output configuring information; an acquisition step of acquiring output size of a prescribed page from the output configuring information of the output image data in the intermediate data format stored temporarily on the storage medium; and a changing step of changing the size of each page of the output image data based upon the output size

acquired at the acquisition step.

According to the present invention, the foregoing object is attained by providing a computer-readable memory storing program code for control of an

5 information processing system having a multifunction apparatus, which is equipped with a facsimile function, and an information processing apparatus, the memory having: program code of a temporary storing step of temporarily storing, in the information processing
10 apparatus in an intermediate data format, output image data composed of a plurality of pages as well as output configuring information; program code of an acquisition step of acquiring output size of a prescribed page from the output configuring information of the output image
15 data in the intermediate data format stored temporarily in the information processing apparatus; and program code of a changing step of changing the size of each page of the output image data based upon the output size acquired at the acquisition step.

20 According to the present invention, the foregoing object is attained by providing a computer-readable memory storing program code for control of an information processing apparatus connected to a multifunction apparatus equipped with a facsimile
25 function, the memory having: program code of a temporary storing step of temporarily storing, on a

storage medium in an intermediate data format, output
image data composed of a plurality of pages as well as
output configuring information; program code of an
acquisition step of acquiring output size of a
5 prescribed page from the output configuring information
of the output image data in the intermediate data format
stored temporarily on the storage medium; and program
code of a changing step of changing the size of each
page of the output image data based upon the output size
10 acquired at the acquisition step.

Other features and advantages of the present
invention will be apparent from the following
description taken in conjunction with the accompanying
drawings, in which like reference characters designate
15 the same or similar parts throughout the figures
thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

20 Fig. 1 is a block diagram illustrating the
configuration of an information processing system
applicable to an embodiment of the present invention;

Fig. 2 is a diagram showing the details of
construction of a reader and printer applicable to the
25 embodiment of the present invention;

Fig. 3 is a block diagram illustrating the details

of construction of an external unit applicable to the
embodiment of the present invention;

Fig. 4 is a block diagram illustrating the details
of construction of an image processing apparatus
5 according to the embodiment of the present invention;

Fig. 5 is a block diagram illustrating the
functional construction of print processing in the image
processing apparatus according to the embodiment of the
present invention;

10 Fig. 6 is a block diagram illustrating the
functional construction of the image processing
apparatus according to the embodiment of the present
invention;

Fig. 7 is a diagram showing a configuration window
15 according to the embodiment of the present invention;

Fig. 8 is a diagram showing a configuration window
according to the embodiment of the present invention;

Fig. 9 is a diagram showing a configuration window
according to the embodiment of the present invention;

20 Fig. 10 is a diagram illustrating information
spooled in a facsimile information file according to the
embodiment of the present invention;

Fig. 11 is a diagram illustrating setting
parameters of a cover page according to the embodiment
25 of the present invention;

Fig. 12 is a diagram illustrating information

spooled in a spool file according to the embodiment of the present invention;

Fig. 13 is a flowchart showing processing executed by a spool file manager according to the embodiment of the present invention;

Fig. 14 is a diagram showing the content of data which the spool file manager acquires from a printer driver according to the embodiment of the present invention;

Fig. 15 is a flowchart showing the details of processing executed at a step S801 according to the embodiment of the present invention;

Fig. 16 is a flowchart showing the details of processing executed at a step S804 according to the embodiment of the present invention;

Fig. 17 is a diagram showing the content of cover-page information according to the embodiment of the present invention;

Fig. 18 is a diagram showing the content of transmission data according to the embodiment of the present invention; and

Fig. 19 is a diagram showing a plotting method at the time of enlargement and reduction in a despooler according to the embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A preferred embodiment of the present invention will now be described in detail with reference to the drawings.

5 Before an image processing apparatus 3000 according to this embodiment is described, we will describe the configuration of an information processing system applicable to the present invention and comprising a multifunction apparatus 4000, which is equipped with a
10 facsimile transmission function, and the information processing apparatus 3000.

Fig. 1 is a block diagram illustrating the configuration of an information processing system applicable to an embodiment of the present invention.

15 As shown in Fig. 1, the multifunction apparatus 4000 includes a reader 4100, a printer 4200 and an external unit 4300. The reader 4100 is an image input unit for reading the image of a document and outputting image data. The printer 4200 is an image output unit,
20 which has printing paper cassettes of a plurality of types, for outputting image data in the form of a visible image on the printing paper in response to print command. The external unit 4300 is electrically connected to the reader 4100 and has a variety of
25 functions. The external unit 4300 is connected to the information processing apparatus 3000 and is capable of

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sending data to and receiving data from the information processing apparatus 3000. Further, the external unit 4300 is capable of communicating via a telephone line.

The details of construction of the reader 4100 and
5 printer 4200 will be described with reference to Fig. 2.

Fig. 2 is a diagram showing the details of construction of the reader 4100 and printer 4200 applicable to the embodiment of the present invention.

Documents stacked on a document feeder 4101 of the
10 reader 4100 are transported to a glass platen 4102 one sheet at a time. When a document is transported to a predetermined position of the glass platen 4102, a scanner lamp 4103 lights and a scanner unit 4104 moves, thereby exposing and scanning the document. Light
15 reflected from the document enters a CCD image sensor 4109 (referred to as a "CCD" below) via mirrors 4105, 4106, 4107 and a lens 4108.

Next, the image signal that has been input to the printer 4200 is converted to an optical signal, which
20 has been modulated by an exposure controller 4201, and the optical signal irradiates a photosensitive drum 4202. A latent image formed on the photosensitive drum 4202 by the irradiating light is developed by a developing device 4203. At a timing in conformity with
25 the leading edge of the latent image, transfer paper is transported by a transfer-paper stacker 4204 or 4205 and

the developed image is transferred to the paper at a transfer unit 4206. After the transferred image is fixed on the transfer paper at a fixing unit 4207, the paper is ejected to the exterior of the apparatus from a paper ejection unit 4208.

Transfer paper output from the paper ejection unit 4208 is ejected into the proper bins if a sorter 4220 is working or into the uppermost bin of the sorter if the sorter is not working. If images read in one after another are to be output onto both sides of a single sheet of transfer paper, the sheet of transfer paper that has been fixed by the fixing unit 4207 has its transport direction reversed once it has been transported as far as the paper ejection unit 4208 and then is transported via a transport-direction switching member 4209 to a stacking portion 4210 for resupplying the paper. When the next document is prepared, the document image is read through a process similar to that described above and the transfer paper is supplied from the stacking portion 4210 for resupplying paper. As a result, two document images are printed on the same output sheet of paper, i.e., one image is printed on the front side and one image on the back side of the sheet of paper.

The details of the construction of the external unit 4300 will now be described with reference to Fig.

3.

Fig. 3 is a block diagram illustrating the details of construction of the external unit 4300 applicable to the embodiment of the present invention.

5 The external unit 4300 is connected to the reader 4100 by a cable and controls signals and functions by an internal core unit 4307. The external unit 4300 includes a hard disk 4308 for storing various information, a facsimile unit 4301 for facsimile
10 transmission and reception, a file unit 4302 for converting various document information to electrical signals and saving the information on a magneto-optic disk (external storage device 4303), a formatter 4305 for expanding code from the information processing
15 apparatus 3000 into image information, a computer interface 4304 for interfacing the information processing apparatus 3000, an image memory 4306 for storing information from the reader 4100 and temporarily storing information sent from the information processing
20 apparatus 3000, and the core unit 4307 for controlling each of these components.

The details of the construction of the information processing apparatus 3000 will be described with reference to Fig. 4.

25 Fig. 4 is a block diagram illustrating the details of construction of the information processing apparatus

3000 according to this embodiment of the present invention.

The information processing apparatus 3000 includes a CPU 3001, a RAM 3002, a ROM 3003, a keyboard
5 controller (KBC) 3005, a CRT controller (CRTC) 3006, a disk controller (DKC) 3007, a printer controller (PRTC) 3008, a keyboard (KB) 3009, a CRT display (CRT) 3010 and an external memory 3011.

The CPU 3001 is a central processing unit which
10 performs overall control of various devices connected to a system bus 3004. The CPU 3001 executes the processing of documents which contain a mixture of graphics, images, characters and tables (spreadsheets, etc.) based upon a document processing program that has been stored
15 in a program ROM 3003b (described later) of ROM 3003 or in the external memory 3011. Further, the CPU 3001 executes processing to expand (rasterize) outline fonts in a display RAM provided in, say, the RAM 3002, and implements a WYSIWYG (What You See I What You Get)
20 function (a function through which what appears on the CRT display screen can be printed in exactly the size and shape displayed).

Further, on the basis of commands designated by a mouse cursor (not shown) or the like on the CRT display
25 3010, the CPU 3001 opens various windows that have been registered and executes a variety of data processing.

When printing is executed using the multifunction apparatus 4000, the user opens a window relating to printing settings and can configure the multifunction apparatus 4000 and set a printing processing method in
5 regard to a printer driver, the setting including the selection of a printing mode.

The RAM 3002 functions as the main memory and work area of the CPU 3001. The ROM 3003 has a font ROM 3003a, the program ROM 3003b and a data ROM 3003c. The
10 font ROM 3003a or external memory 3011 store font data used when the above-mentioned document processing is executed. The program ROM 3003b or external memory 3011 store the operating system (OS), which is the program for controlling the CPU 3001. The data ROM 3003c or
15 external memory 3011 stores various data used when processing such as the above-mentioned document processing is executed.

The keyboard controller 3005 controls inputs from the keyboard 3009 and from a pointing device, which is
20 not shown. The CRT controller 3006 controls the display on the CRT display 3010. The disk controller 3007 controls access to the external memory 3011. The printer controller 3008, which is connected to the multifunction apparatus 4000 (external unit 4300) via a
25 bidirectional interface 3012, executes processing for controlling communication with the multifunction

apparatus 4000. The keyboard 3009 has a variety of keys.

The CRT display 3010 displays graphic, images, text and tables, etc. The external memory 3011, which is
5 constituted by a hard disk (HD) or floppy disk (FD), etc., stores a booting program, various applications, fond data, user files, edited files and a printer control command generating program (referred to as a "printer driver" below), etc.

10 The CPU 3001, RAM 3002, ROM 3003, keyboard controller 3005, CRT controller 3006, disk controller 3007 and printer controller 3008 are provided in a computer control unit 3500.

Those functional components of the information
15 processing apparatus 3000 that are typical printing processing functional components which execute the processing of a computer or the like connected, directly or through a network, to the printer of the multifunction apparatus 4000 will now be described with
20 reference to Fig. 5.

Fig. 5 is a block diagram illustrating the functional construction of printing processing in the image processing apparatus according to the embodiment of the present invention.

25 In Fig. 5, an application 201, graphic engine 202, printer driver 203 and system spooler 204 exist as files

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preserved in the external memory 3011 of Fig. 4. These
are program modules which, when they are to be executed,
are loaded in the RAM 3002 and executed by the operating
system and by modules which utilize these modules. The
5 application 201 and the printer driver 203 can be added
to and stored on a floppy disk or CD-ROM of the external
memory 3011 or, via a network (not shown), on the hard
disk of the external memory 3011.

Described next will be a procedure through which a
10 document which the user has created using the
application 201 is printed by the multifunction
apparatus 4000.

First, the user instructs the operating system to
launch the application 201. In response, the operating
15 system loads the application 201, which has been stored
in the external memory 3011, in the RAM 3002 and then
launches the application. The user creates a document
using the application 201, or opens an already existing
document, and then selects an output destination in a
20 printer selection window provided by the operating
system or application.

Next, the user orders the application 201 to
configure printing of the document. The application 201
notifies the graphic engine 202 of this order and the
25 graphic engine 202 responds by loading the printer
driver 203 corresponding to the selected printer from

the external memory 3011 to the RAM 3002 and instructs the printer driver 203 to display a printing configuration window. The printer driver 203 then displays the configuration window. The user makes
5 various settings in the configuration window and the printer driver 203 sends the specified settings information (this information will be referred to as "DEVMODE" below) back to the application 201 via the graphic engine 202.

10 Next, the user orders the application 201 to print the document. In order for the application 201 to instruct the printer driver 203 to configure printing, the application initializes the printer driver 203, using the previously acquired DEVMODE, via the graphic
15 engine 202. The application 201 then sends a print command to the graphic engine 202 via a GDI (Graphic Device Driver), and the graphic engine 202 converts the received print command to a DDI (Device Driver Interface) and sends the print command to the printer
20 driver 203.

On the basis of the DDI received from the graphic engine 202, the printer driver 203 converts the command of a control command, e.g., PDL (Page Description Language), that is capable of being recognized by the
25 printer or multifunction apparatus. The control command obtained by the conversion is output to the

multifunction apparatus 4000 as print data via the system spooler 204, which has been loaded in the RAM 3002 by the operating system, through the bidirectional interface 3012.

5 Reference will now be had to Fig. 6 to describe functional components, which constitute a feature of the present invention, obtained by adding an arrangement, which spools print data from the application temporarily as intermediate code data, to the functional components
10 of the information processing apparatus 3000 illustrated in Figs. 4 and 5.

Fig. 6 is a block diagram illustrating the functional construction of the image processing apparatus according to the embodiment of the present
15 invention.

The block diagram of Fig. 6 is obtained by expanding the functions shown in Fig. 5 and has means for temporarily generating a spool file 303, which comprises intermediate code, when a print command is
20 sent from the graphic engine 202 to the printer driver 203. In Fig. 6, the content of the spool file 303 is manipulated and a despooler 305 executes actual printing based upon the manipulated content, whereby functions not possessed by the application can be implemented in
25 regard to the print data from the application, these functions including adding on a cover page, transmitting

data repeatedly to a plurality of facsimile transmission destinations, changing the size of the cover page, enlarging/reducing the body of the document, and processing conforming to the destination of an output
5 from the multifunction apparatus 4000 (e.g., printout, FAX transmission, preservation on a hard disk, etc.).

The details of the construction of Fig. 6 will now be described.

When the user instructs the application 201 to
10 perform printing (facsimile transmission), first the application 201 sends a printing start command (GDI: StartDoc) to a dispatcher 301 via the graphic engine 202. The dispatcher 301 calls a configuration window provided by the printer driver 203. The configuration
15 windows of the printer driver 203 include the windows shown in Figs. 7, 8 and 9.

Each of these windows will be described with reference to Figs. 7, 8 and 9.

Figs. 7, 8 and 9 are diagrams showing configuration
20 windows according to the embodiment of the present invention.

Fig. 7 shows a window for editing a telephone directory list. This window makes it possible to define individuals and groups that are the destinations of
25 facsimile transmission and to register these in a database (described later) of a telephone directory

list.

Fig. 8 shows a window for configuring transmission. Here a document is transmitted by facsimile to a specified transmission destination. This window makes it possible to specify a new transmission destination or to specify an individual or group, which has already been registered in the telephone directory list, as the transmission destination, and to add a new transmission destination to the telephone directory list.

Fig. 9 shows a configuration window relating to a cover page attached when a facsimile transmission is performed. There are three ways of attaching cover pages that can be selected, namely "DO NOT ATTACH", "ATTACH A SEPARATE PAGE FOR EACH SENDER", and "ATTACH THE SAME PAGE FOR ALL". In a case where a cover page is attached, the type of cover page and the content of the cover page can be set. If the user makes settings in each of these windows, clicks an OK button and closes the windows, the printer driver 203 updates the content of the database of the telephone directory list and spools the settings relating to the cover pages and the transmission settings in a facsimile information file 306 job by job.

Next, the information spooled in the facsimile information file 306 will be described with reference to Fig. 10.

Fig. 10 is a diagram illustrating information spooled in the facsimile information file according to this embodiment of the present invention.

Here individual information and group information
5 has been stored in a database section of the telephone directory list. Information is displayed, added to, edited and deleted from the editing window of the telephone directory list shown in Fig. 7. New individual information can be added on also from the
10 transmission configuration window shown in Fig. 8. Further, a transmission destination specified in the transmission setting window of Fig. 8 and the setting relating to a cover page specified in the cover-page related configuration window of Fig. 9 have been stored,
15 on a per-job basis, in a job-by-job settings section. The settings relating to the cover page store the values shown in Fig. 11 in information "Cover Type" of each job. In order to store the settings job by job, a job ID is set as the identifier of each job.

20 After sending the command StartDoc, the application 201 sends the dispatcher 301 a page start command (GDI: StartPage), a plot command for any object included on the page and a page end command (GDI: EndDoc) successively via the graphic engine 202. The dispatcher
25 301 determines whether a DDI accepted from the graphic engine 202 is the result of converting a GDI, which has

been sent from the application 201, by the graphic engine 202, or the result of similarly converting a GDI that has been sent from the despooler 305. In a case where the GDI has been sent from the application 201 to
5 the graphic engine 202, the dispatcher 301 loads a spooler 302, which has been stored in the external memory 3011, in the RAM 3002 and sends a print command to the spooler 302.

Information spooled in the spool file 303 will be
10 described with reference to Fig. 12.

Fig. 12 is a diagram illustrating information spooled in a spool file 303 according to this embodiment of the present invention

The information to be spooled has the structure
15 shown at 1201.

A job settings information section includes Job ID which identifies a job, and Destination which indicates the destination of an output. The destination is data which indicates a plurality of destinations (printout, facsimile transmission, preservation on a hard disk,
20 etc.) of outputs from the multifunction apparatus 4000. Further, Paper Size Option, which indicates the paper size options, is set. For example, a desired paper size option from the paper size options indicated at 1202 is
25 set by the corresponding number. Furthermore, Paper Size, which indicates the size of the paper, is set.

Settings (paper size, etc.) regarding the pages included in a job are preserved in a page settings information section. In a case where the same settings have been made for all pages, the setting for one page is preserved. If different settings have been made in one job, the number of settings that have been made are preserved.

The configuration information (Dev Mode ID) of each page, information (record type, output position, etc.) of all plot records included in each page and information concerning objects (fonts, pens, brushes, etc.) used by a plot record is spooled in a plot-object information section. Dev Mode ID specifies the particular page settings that have been preserved in the page settings information section.

The spool file 303 is generated independently by the spooler 302 for every print job executed from the application 201. The spooler 302 converts the accepted print command to an intermediate code and preserves the intermediate code on a per-page basis in the plot-object information section of the spool file 303. Further, the spooler 302 acquires the configuration information, which relates to print data set by the application on a per-job or per-page basis the printer driver 203, and preserves the information in the job settings information section and page settings information

section of the spool file 303. Though the spool file 303 is generated as a file in the external memory 3011, the file may be generated in the RAM 3002.

Furthermore, the spooler 302 loads a spool file manager 304, which has been stored in the external memory 3011, into the RAM 3002 and notifies the spool file manager 304 of the status of spool file generation (job start/end, page start/end).

Processing executed by the spool file manager 304 will now be described with reference to Fig. 13.

Fig. 13 is a flowchart showing processing executed by the spool file manager 304 according to this embodiment of the present invention.

At step S801 in Fig. 13, Cover Type, which indicates the cover-page attachment setting, and a Job Copies value, which signifies the total number of jobs into which a job is separated, are received from the printer driver 203. The data accepted and the meanings thereof are illustrated in Fig. 14. Further, the details of processing executed at step S801 will be described later.

Next, at step S802, the value of a variable K for counting the number of despoolings is made 1, and J is initialized to the value of Job Copies. At steps S803 to S806, processing is executed repeatedly in such a manner that despooling processing at step S804 will be

executed a number of times equivalent to the total number of separated jobs (Job Copies). Processing is terminated at the moment execution has been performed the number of times equivalent to Job Copies.

5 More specifically, it is determined at step S803 whether J is greater than zero. If J is less than zero ("NO" at step S803), processing is terminated. If J is greater than zero ("YES" at step S803), on the other hand, control proceeds to step S804, at which the
10 despooler is instructed of the K-th despooling processing. The details of the processing executed at step S804 will be described later. This is followed by step S805, at which K is incremented by 1, and then by step S806, at which J is decremented by 1. Control then
15 returns to step S803.

Reference will be had to Fig. 15 to describe the details of the processing executed at step S801, namely the processing through which the application 201 calculates Cover Type, which indicates the cover-page
20 attachment setting, and Job Copies, which indicates the total number of separated jobs.

Fig. 15 is a flowchart showing the details of processing executed at a step S801 according to this embodiment of the present invention.

25 At step S1001, the application 201 reads in the applicable job information from the job-by-job settings

section (see Fig. 10) of the facsimile information file 306 and initializes Cover Type and Address Count.

Address Count, which is a numerical value indicating the total number of transmission destinations, is the actual
5 number of transmission destinations obtained by totaling the numbers of destinations of individuals contained in the transmission-destination information and the number of individuals in each group contained in the transmission-destination information. The total number
10 of separated jobs Job Copies to be calculated is initialized to zero.

Next, at step S1002, it is determined whether Cover Type has been set to 1 (meaning that a different cover page is attached for each sender). In case of 1 ("YES"
15 at step S1002), control proceeds to step S1003, at which Address Count is set to Job Copies. This means that jobs are generated in a number equivalent to the number of transmission destinations in order to send each transmission destination a job having a different cover
20 page attached thereto.

If it is found at step S1002 that the Cover Type is not 1 ("NO" at step S1002), i.e., if Cover Type is 0 (no cover is attached) or 2 (the same cover page is attached for all), the same job is sent to all transmission
25 destinations. At step S1004, therefore, the largest number of transmission destinations (Address Max) to

which a transmission can be made under a single job is acquired. This is followed by step S1005, at which the minimum required number of jobs $[(\text{Address Count} + \text{Address Max} - 1) / \text{Address Max}]$ is calculated and this value is set as Job Copies. Here it is assumed that the operator "/" returns an integral value obtained by discarding the remainder.

The printer driver 203 already holds the maximum number of transmission destinations of the connected multifunction apparatus 4000 as fixed-value data or acquires it from the multifunction apparatus 4000 via the bidirectional interface 3012. When the maximum number of transmission destinations is acquired from the multifunction apparatus 4000, it may be acquired directly or data that influences the maximum number of transmission destinations, such as the memory capacity of the multifunction apparatus 4000 and the disk capacity, may be acquired and the printer driver 203 may decide the maximum number of transmission destinations from this data.

Reference will now be had to Fig 16 to describe the processing executed at step S804.

Fig. 16 is a flowchart showing the details of processing executed at a step S804 according to this embodiment of the present invention.

It should be noted that the spool file manager 304

instructs the despooler 305 to execute despooling processing at step S804. At this time Job ID, which is the job identifier, the value of the variable K, which indicates how many times despooling processing has been
5 executed, and Cover Type, which signifies the cover-page attachment setting, are delivered to the despooler 305. Here the K-th despooling processing which the spool file manager 304 has instructed the despooler 305 to perform is indicated.

10 First, at step S1101, the despooler 305 sends the print start command (GDI: StartDoc) to the dispatcher 301 via the graphic engine 202. The dispatcher 301 determines whether the DDI accepted from the graphic engine 202 is the result of converting a GDI, which has
15 been sent from the application 201, by the graphic engine 202, or the result of similarly converting a GDI that has been sent from the despooler 305. If the GDI has been sent from the despooler 305 to the graphic engine 202, the dispatcher 301 loads the printer driver
20 203, which has been stored in the external memory 3011, in the RAM 3002 and sends a print command to the printer driver 203.

At steps S1102 to S1107, the transmission destination (the telephone number, etc., of the
25 transmission destination) and the cover-page information (cover-page size, cover-page plot content, etc.) are

acquired together with the cover-page settings (Cover Type). If Cover Type is 1 (meaning that a different cover page is attached for each sender), then, as indicated at step S1003 in Fig. 15, the total of copies into which a job is separated (Job Copies) is the number of transmission destinations (Address Count) and the processing of step S804 is executed a number of times equal to the number of transmission destinations (Address Count). In other words, in the K-th despooling processing, a cover page for the K-th transmission destination is attached and transmitted to the K-th transmission destination.

Accordingly, if it is found at step S1002 that the Cover Type is 1 (a different cover page is attached for each sender) ("YES" at step S1002), then the K-th transmission destination is acquired at step S1103. This is followed by step S1104, at which the cover-page information of the K-th transmission destination is acquired. The transmission destination and cover-page information are acquired from the printer driver 203 by the despooler 305. The printer driver 203 retrieves the K-th transmission destination from the transmission-destination information contained in the applicable job information of the job-by-job settings section of facsimile information file 306 and sends this transmission destination back to the despooler 305.

Further, the printer driver 203 likewise sends the cover-page plot data of the applicable job back to the despooler 305. The content of the cover-page information will now be described with reference to Fig. 17.

Fig. 17 is a diagram showing the content of cover-page information according to this embodiment of the present invention,

The cover information has the structure indicated at 1701.

A cover-page settings section includes a setting relating to the paper size of the cover page. A template used for the cover page is specified in Template. This indicates a template specified as the type of page when the cover-page related settings shown in Fig. 9 are made. Of data rendered on the cover page, plot data of portions that are not changed by the transmission destination is defined in the template. The content is preserved in an intermediate-code format in a manner similar to that of the spool file 303. Of course, the storage format may be an ordinary metafile format capable of being rendered by the despooler 305. Further, Cover Page Option, which indicates the cover page, has been set. For example, a desired cover page option from the cover page options indicated at 1702 is set by the corresponding number. Furthermore, Cover

Paper Size, which indicates the size of the cover page, has been set.

5 A plot-object section includes information such as the sender, transmission destination, an attention label and comments, etc. This signifies information of a plot object specified from the dialog screen of Fig. 9.

Information other than the transmission destination has the same content for all separated jobs. The necessary information is therefore read out of the cover-page plot data of the applicable job in the job-by-job settings section of the facsimile information file 306 and this information is written to the plot-object section. In regard to transmission destination, the name of a transmission destination of a separated job, the facsimile number, company name and post name are read out of the directory database section of the facsimile information file 306 and written to the plot-object section. Thus, the printer driver 203 generates cover-page information and returns it to the despooler 305.

20 With reference again to Fig. 16, a plurality of specified transmission destinations are acquired at step S1105 if it is found at step S1102 that Cover Type is not 1 ("NO" at step S1002), i.e., if Cover Type is 0 or 2. Since the number of transmission destinations to which a transmission can be made by a single despooling process is Address Max, the transmission destination to

which a transmission is made by the K-th despooling is an (Address Max \times K)-th transmission destination from the {[Address Max \times (K-1)] + 1}-th. The transmission destination is acquired from the printer driver 203.

- 5 The printer driver 203 retrieves the (Address Max \times K)-th transmission destination from the {[Address Max \times (K-1)] + 1}-th from the transmission-destination information contained in the applicable information of the job-by-job settings section of facsimile information
- 10 file 306 and sends this information back to the despooler 305.

- Next, if it is found at step S1106 that Cover Type is 2 (the same cover page is attached for all) ("YES" at step S1106), the same cover page is transmitted to all
- 15 transmission destinations. At step S1107, therefore, the cover-page information of all transmission destinations is acquired. The cover-page information is acquired by the despooler 305 from the printer driver 203. The latter sends back, to the despooler 305,
- 20 cover-page plot data contained in the information of the applicable job of the job-by-job settings section of facsimile information file 306 and cover-page plot data relating to transmission destination contained in the telephone directory database section of facsimile
- 25 information file 306. On the other hand, if it is found at step S1106 that Cover Type is not 2 ("NO" at step

S1106), this means that Cover Type is 0 (no cover is attached) and, hence, cover-page information is not acquired.

At step S1108, the despooler 305 instructs the
5 printer driver 203 of the transmission destination. The printer driver 203 responds by starting the creation of transmission data in the multifunction apparatus 4000.

The content of the transmission data will be described with reference to Fig. 18.

10 Fig. 18 is a diagram showing the content of transmission data according to this embodiment of the present invention.

On the basis of the transmission-destination information specified by the despooler 305, the printer
15 driver 203 acquires a telephone number from the facsimile information file 306 and generates the data in a job control portion of the transmission data shown in Fig. 18. The generated data is transmitted to the multifunction apparatus 4000 via the system spooler 204.

20 With reference again to Fig. 16, it is determined at step S1109 whether or not there is a cover page, i.e., whether or not Cover Type = 0. If there is a cover page, then, on the basis of the cover-page information acquired at step S1104 or S1107, a cover
25 page output is performed with respect to the printer driver 203 via the graphic engine 202.

If it is found at step S1109 that there is no cover page [i.e., that Cover Page Option is 0 (page size of cover page)] ("NO" at step S1109), the despooler 305 reads out the page configuration identifier of the

5 leading page of the plot-object information section of spool file 303, retrieves the applicable page settings of the page-information section, acquires the paper size of the leading page and adopts this as the paper size of the cover page.

10 On the other hand, if it is found at step S1109 that there is a cover page [i.e., that Cover Page Option is 1 (page size specified in Cover Page Size)] ("YES" at step S1109), the paper size indicated by the paper ID specified in Cover Page Size of the cover-page settings

15 section is adopted as the paper size of the cover page.

The despooler 305 executes rendering upon enlarging or reducing the plot data, which is contained in the template, in conformity with the paper size of the cover page. Further, plot data contained in the plot-object

20 section of the cover-page information also is rendered upon being similarly enlarged or reduced at this time.

The plotting method at the time of enlargement or reduction in the despooler 305 will be described with reference to Fig. 19.

25 Fig. 19 is a diagram showing a plotting method at the time of enlargement and reduction in a despooler

according to the embodiment of the present invention.

When the despooler 305 decides the size of the cover page, it obtains the size of an effective printing area on the paper from the printer driver 203. In Fig. 19, X0, Y0 indicate the size of Template, and X1, Y1 and X2, Y2 indicate the effective printing area of the paper actually output. The despooler 305 obtains the enlargement/reduction rate through the following calculation:

10 Min (X/X0, Y/Y0)

where Min is an operator for returning the smaller numerical value of the data enclosed by the parentheses. Further, the operator "/" returns a real-number value. The plotting content of Template is enlarged or reduced to the rectangular sizes indicated by the shading in Fig. 19. The rectangular size signifies the maximum size that can be rendered, without changing the aspect ratio, with regard to the effective printing area of the output destination. Here the output rectangle enlarged or reduced is placed so as to contact the position at the upper left of the effective printing area. However, the output rectangle may be disposed so as to be centered vertically and horizontally. Thus, the rendering of all objects in the output rectangular area that has been decided is executed upon applying the position of each object contained in Template and the

enlargement/reduction rate obtained by the above-mentioned calculation in regard to the size of each object. For example, if the upper left is the origin for both Template and the effective printing area in the case of Fig. 19, then the coordinates and size of each object are multiplied by the enlargement/reduction rate found above, thereby making it possible to obtain the coordinates and size of the output-destination object.

The printer driver 203 accepts these cover-page plot commands, generates the cover-page plot data of the plot-data portion shown in Fig. 18 and transmits the data to the multifunction apparatus 4000.

With reference again to Fig. 16, the despooler 305 instructs the printer driver 203, via the graphic engine 202 and dispatcher 301, to render the plot objects of all pages contained in the plot-object information section of spool file 303 (step S1111). If Paper Size Option of the job settings section of graphic engine 202 is 0 (paper size on per-page basis) at this time, output is made with respect to the paper size indirectly specified by Dev Mode ID of each page in the plot-object information section. If Paper Size Option is 1 (paper size of leading page), then, while enlargement or reduction is performed on a per-page basis, output is carried out with respect to the paper size specified by Dev Mode ID of the leading page in the plot-object

information section. If Paper Size Option is 2 (paper size specified in Paper Size), then, while enlargement or reduction is performed on a per-page basis, output is carried out with respect to the paper size indicated by the paper ID that has been specified in Paper Size in the job settings section. In regard to enlargement/reduction, the plot object of each page is output upon being enlarged or reduced through a method similar to that employed when the cover page was enlarged or reduced and then output.

The printer driver 203 accepts these plot instructions, creates the plot data of each page of the plot data portion shown in Fig. 18 and transmits this data to the multifunction apparatus 4000.

Upon receiving the transmission data shown in Fig. 18 from the printer driver 203 via the system spooler 204, the external unit 4300 expands the image information in accordance with the plot data portion of the data using the formatter 4305. If FAX has been specified in the output destination information of the job control portion of the data, the expanded image information is transferred to the facsimile unit 4301 together with the telephone number of the job control portion. The facsimile unit 4301 transmits the specified image information to the specified transmission destination. If the output destination is

other than facsimile, the expanded data is transferred to the specified output destination (to the printer 4200 in case of printout and to the hard disk 4308 in case of the hard disk).

- 5 The despooler 305 sends a print end command (GDI: EndDoc) to the dispatcher 301 via the graphic engine 202 at step S1112, after which processing is terminated.

Thus, in accordance with this embodiment, as described above, a transmission document and configuring
10 information for this document are managed as intermediate data in a spool file and the document can be transmitted to a transmission destination upon changing the content of the document while referring to the intermediate data. As a result, even if the
15 transmission document includes a plurality of mixed paper sizes, for example, the user need not create the document again in order to uniformalize the paper sizes; the paper sizes are uniformalized automatically. Further, in order to make the size of a cover page the
20 same as that of each transmission document, the user need not prepare cover pages whose sizes differ depending upon the transmission documents; a cover page whose paper size is the same as that of the transmission document is attached automatically.

- 25 The present invention can be applied to a system constituted by a plurality of devices (e.g., a host

computer, interface, reader, printer, etc.) or to an apparatus comprising a single device (e.g., a copier or facsimile machine, etc.).

Furthermore, it goes without saying that the object
5 of the invention is attained by supplying a storage medium storing the program codes of the software for performing the functions of the foregoing embodiment to a system or an apparatus, reading the program codes with a computer (e.g., a CPU or MPU) of the system or
10 apparatus from the storage medium, and then executing the program codes.

In this case, the program codes read from the storage medium implement the novel functions of this embodiment, and the storage medium storing the program
15 codes constitutes the invention.

Further, the storage medium, such as a floppy disk, hard disk, optical disk, magneto-optical disk, CD-ROM, CD-R, magnetic tape, non-volatile type memory card or ROM can be used to provide the program codes.

20 Furthermore, besides the case where the aforesaid functions according to the embodiment are implemented by executing the program codes read by a computer, it goes without saying that the present invention covers a case where an operating system or the like running on the
25 computer performs a part of or the entire process in accordance with the designation of program codes and

implements the functions according to the embodiments.

It goes without saying that the present invention further covers a case where, after the program codes read from the storage medium are written in a function expansion board inserted into the computer or in a memory provided in a function expansion unit connected to the computer, a CPU or the like contained in the function expansion board or function expansion unit performs a part of or the entire process in accordance with the designation of program codes and implements the function of the above embodiment.

As many apparently widely different embodiments of the present invention can be made without departing from the spirit and scope thereof, it is to be understood that the invention is not limited to the specific embodiments thereof except as defined in the appended claims.